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ABSTRACT

The purpose of this 7-12 curriculum is to provide teachers and other educators with classroom lessons and home surveys that are a starting point for understanding five significant environmental issues - water, toxics, energy, transportation, and solid waste/recycling. While each of these environmental issues is complex and has far-reaching implications, the lessons and home surveys can serve as a way for teachers, students and families to begin thinking about these issues in relationship to their own lives. The lesson plan involves two 45-minute lessons and a take home survey. On the first day of the lesson, students are introduced to the five issues and take home a survey to be completed, if possible, with other family members. Students return to school with their completed surveys and discuss the results on the second day of the lesson. This document contains the lesson plans; surveys; a guide to taking action; and fact sheets on "The Automobile", "Energy & Environment," and "Global Warming." (CW)

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EARTH DAY 1990

LESSON PLAN AND HOME SURVEY–7-12

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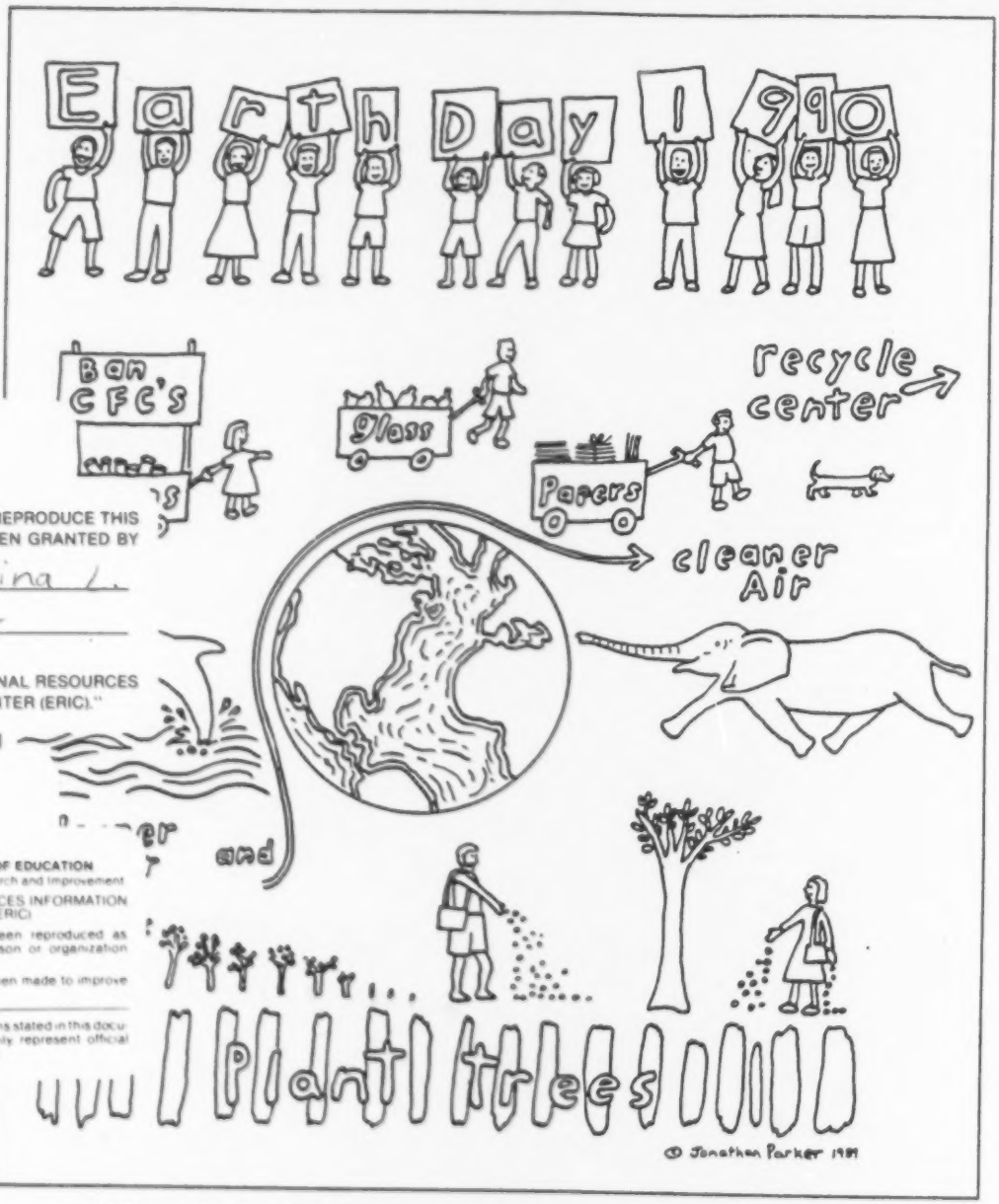

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WITH FACT SHEETS & HOME ACTION GUIDE

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Earth Day 1990

Lesson Plan and Home Survey—Grades 7-12

Energy, Solid Waste/Recycling, Toxics , Transportation and Water with Fact Sheets and Action Guide

Amy Holm-Shuett and Greg Shuett, Principal Writers
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Endorsed By:

The American Federation of Teachers

The National Education Association

National Association of State Boards of Education

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LESSON PLANS, HOME SURVEYS AND FOLLOW-UP ACTIVITIES–K-12

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Earth Day 1990

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2/15/90

Dear Educator:

Twenty years ago, on the first Earth day, 20 million Americans turned out to demonstrate their concern for a better environment. Students and educators throughout the nation played a significant role in the success and effectiveness of the first Earth Day. Campuses and schools across the country orchestrated thousands of educational teach-ins and special classroom instruction.

In the ensuing twenty years, a number of the problems that fueled the original Earth Day have been addressed effectively. Following Earth Day, 1970, the Environmental Protection Agency was created and Congress passed the Clean Air and Water Acts. Environmental consciousness was raised nation-wide. And many of the participants who were children or youth then are working for the health of the planet today.

Despite the environmental progress that has been made, the past two decades have seen many of our environmental problems worsen, and our planet now faces a diverse array of new ills. On April 22, 1990, the 20th anniversary of the first Earth Day, 100 million people demanding action for our endangered earth are expected to participate in the United States and in more than 120 countries around the world. The primary objective of Earth Day 1990 has been to launch a decade for the environment through public education campaigns and events encouraging individuals to make a difference in their schools, homes, workplaces and communities.

To further our objective of individual responsibility and empowerment through education, Earth Day 1990 is pleased to present the attached Earth Day 1990 K-12 Lesson Plan and Home Survey exercises. This education project has been designed to help equip the next generation of the earth's caretakers with an awareness of how their daily actions, and those of their families, affect the health of the planet.

Thank you for your interest in the Earth Day 1990 curriculum. Your participation and that of K-12 educators across the nation will not only guarantee the success of this exercise, but is vital to our goals of greater environmental awareness and lasting change.

Sincerely,

Denis Hayes
Chair, Earth Day 1990

Chris Desser
Executive Director, Earth Day 1990

Abby Ruskey
K-12 Coordinator

INTRODUCTION

LESSON PLAN AND HOME SURVEY—GRADES 7-12

Purpose of Curriculum

The purpose of the Earth Day 7-12 Curriculum is to provide teachers and other educators with a classroom lesson and home survey that is a starting point for understanding five significant environmental issues—water, toxics, energy, transportation and solid waste/recycling. While each of these environmental issues are complex and have far-reaching implications, the lesson and home survey can serve as a way for teachers, students, and families to begin thinking about these issues in relationship to their own lives. Most important, the lessons are designed to give students a sense of their own power to bring about change.

Students are introduced to each of the five issues in class and then take home a survey which they complete, if possible, with other family members. They return to school with their completed surveys and discuss the results.

How the Curriculum is Organized

The Earth Day 1990 7-12 curriculum is broken down into four components: Background information, Lesson Plan, Home Survey and Action Guide.

The Background Information is provided in the form of fact sheet issued by Earth Day 1990. There is a fact sheet for every issue area covered by the lesson plan and home survey; energy, water, toxics, solid waste/recycling and transportation. Additional, but related fact sheets also are included for the teachers and students use.

The Lesson Plan itself takes two-days, 45 minutes per day. The **Day One** lesson plan is a discussion of natural resources; the origins of and environmental costs involved with their use. Students are then introduced to, and as a class, review the **Home Survey**. During the **Day Two** lesson plan, the class discusses survey results. To aid in the discussion, the teacher and or students poll and chart all of the students surveys. The class then calculates the impact of population growth on the environment and brainstorms solutions to environmental problems that they as individuals and as a class can act upon.

All teachers will also receive the Earth Day 1990 **Action Guide** to pass out to all students at the conclusion of their Day Two discussion. The Action Guide is a listing of simple tips to help the environment for parents and students to work on together in their homes. The Action Guide is designed to be an 11" X 17" poster that can be put up at school or in the home. Teachers can make enough copies of both halves (included in this booklet) for each student and either tape the posters together or have the students attach the two sides themselves.

The Role of Parents/Guardians

It is optimal to have the participation of parents and other family members in the completion of the home survey. However given the busy lifestyles of today's families many children will have to fill the survey out on their own. This is why the 7-12 home survey was written in a way that students could answer the questions independently.

A sample letter to parents is included to help the teacher communicate the purposes and procedures of the home surveys and to encourage family participation. The teacher should add detail where they feel it is necessary.

Sample Letter

Dear Parent,

April 22 this year marks the 20th anniversary of Earth Day. The first Earth Day in 1970 resulted in many positive changes for the environment such as the creation of the Environmental Protection Agency, the Clean Air and Water Acts and generally, heightened public awareness of the environment. Still, there are many environmental problems that threaten us today; toxic waste, groundwater contamination, global warming and species extinction, to name a few.

The national Earth Day 1990 organization has developed a 2-day Lesson Plan and Home Survey that we are using this Spring to discover some ways that we can make the earth a healthier place to live. As part of this exercise the students will be surveying their families about the following issues: water, toxics, energy, recycling and transportation. We will use the results of the survey to discuss these areas further and to think of ways that we might contribute to solving the environmental issues associated with them. Please help your child complete and return their home survey.

Thank you for your help.

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Community Outreach

To inform your local community about what your class is doing for Earth Day, teachers may want to notify local newspapers, post graphs and pictures in libraries, YMCA's, city hall or senior centers and/or create displays for your schools's science fair.

Learning More About the Environment

For teachers who are interested in pursing further lessons in environmental education, the **Environmental Education Resource Guide** included in this packet lists additional environmental education curriculum as well as multi-media and organizational resources.

HOME ENVIRONMENTAL LESSON PLAN—GRADES 7-12

SUMMARY OF ACTIVITY:

Students in grades 7-12 will participate in a class discussion about natural resources and the environment. They will be given a Home Environmental Survey in order to study their own and their families' use of energy, transportation, water, and practices of solid waste and hazardous materials disposal. A follow-up discussion in the classroom will focus on ways that students can use natural resources more efficiently and the impact of the population growth on resources.

BACKGROUND INFORMATION:

See Earth Day 1990 fact sheets included in this packet.

Time: Two 45-minute class periods

Setting: Classroom, home

Materials:

- Home Environmental Survey (included).
- Sample of Survey Graphs (included).
- Light bulb.
- Bottle of water.
- Symbol for car (model or photograph).
- Blackboard and/or poster boards.
- Chalk and/or markers.

OBJECTIVES:

In celebration of the 20th anniversary of Earth Day on April 22, 1990, students throughout the United States will be participating in this activity. A brief, but important pre-survey discussion in the classroom will set the stage for the students to complete the work at home. The Home Environmental Survey can be given as an overnight assignment or as part of a larger unit of study, depending on your students' academic level(s) and subject(s) that you teach. Upon completion of the survey, a graphing activity will show how the aggregate of individual actions can affect the environment in a positive or negative manner. A brainstorming discussion will focus on other ways for individuals to use resources more wisely to benefit their environment.

Students will:

1. Define natural resources.
2. Identify the origin of natural resources that the community uses and the environmental costs associated with their use.
3. Conduct a Home Environmental Survey.
4. Compare and graph the survey results.
5. Brainstorm ways to enhance the efficient use of natural resources and to reduce our negative impact on the environment.

PROCEDURE:

Day One

1. To focus your students on a discussion about the environment and natural resources, read the following passage:

If the Earth were only a few feet in diameter, floating a few feet above a field somewhere, people would come from everywhere to marvel at it. People would walk around it, marvelling at its big pools of water, its little pools and the water flowing between the pools. People would marvel at the bumps on it, and the holes in it, and they would marvel at the very thin layer of gas surrounding it and the water suspended in gas. The people would marvel at all the creatures walking around the surface of the ball, and at the creatures in the water. The people would declare it as sacred because it was the only one, and they would protect it so that it would not be hurt. The ball would be the greatest wonder known, and people would come to pray to it, to be healed, to gain knowledge, to know beauty and to wonder how it could be. People would love it, and

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defend it with their lives because they would somehow know that their lives, their own roundness, could be nothing without it. If the Earth were only a few feet in diameter.

—*Friends of the Earth, New Zealand*

2. Inform the students that on the 20th anniversary of Earth Day, April 22, 1990, students throughout the United States will be studying environmental issues and examining their use of natural resources.

3. Display the following objects: light bulb, bottle of water, and a symbol for the automobile. Explain that these objects represent natural resources that we use every day.

4. Define resources as: a portion of our environment upon which people have placed or assigned value, or see as being available for use.

5. Ask the following questions about each of the objects:

a. What natural resources are represented? (e.g.: crude oil, coal, groundwater)

b. What is the local source of the natural resource? (e.g.: water, reservoirs, mines and wells)

c. What are the environmental impacts from using the natural resource? (e.g.: hazardous waste, destruction of wildlife habitat, air pollution).

6. Explain to the students that they will be receiving a Home Environmental Survey to collect data on their own use of natural resources. Upon completion of the survey, the students will compare and graph the results in class.

7. Distribute the survey to students. Review the topic areas and equations in class.

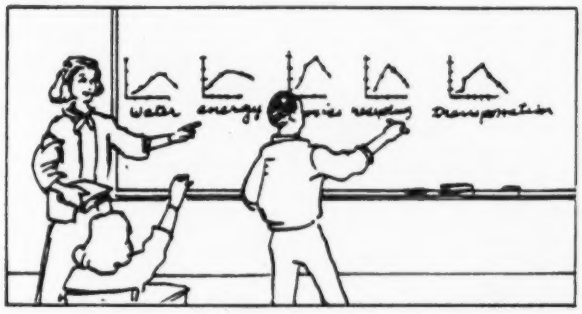
Note:

- *For the exercise on energy students will need to know the price of electricity. Research this through examining your electric bill or calling your local utility to ask what the average cost of a kilowatt hour is in your locality. You may want to have students do this research themselves (they are referred to these same resources in the Home Survey itself).*
- *The Survey exercises on transportation and water each have a bonus question which is optional. The bonus questions entail more involvement on the part of the student and provide more accurate data for their calculations of home resource use.*

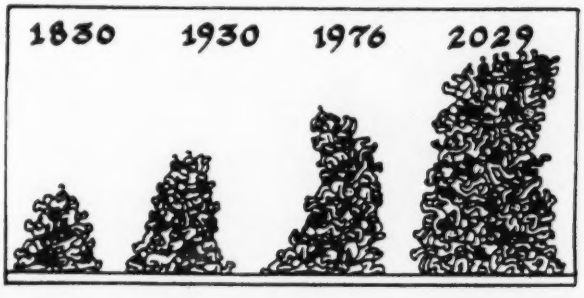
8. Encourage the students to involve family members in researching the information for the sake of accuracy, as well as to stimulate discussion about resource use by members of the household.

Day Two

9. Review and discuss the survey results. Construct five survey polling graphs on the blackboard or on butcher paper (examples on page 12). By polling the students, you can plot their data on the graphs. Find the average of each graph by adding up the students totals and dividing by the number of students (you will use this figure later in this exercise).



10. Explain that globally, the size of our population is increasing. It took from the beginning of time to about the year 1810 for the human population to reach 1 billion people. Just more than 100 years passed before the next billion were added, and the



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population doubled again to 4 billion people by 1974. By 1987, Earth was home to 5 billion human beings, and this number is growing. If the global population continues to increase at the current rate of 1.8 pecent annually, it will double again in just 39 years. To find out how many resources would be used or saved in the next 39 years if your class were to experience the same rate of population growth that is taking place globally, conduct the following exercise with your students:

a. Count up the number of students in the classroom.

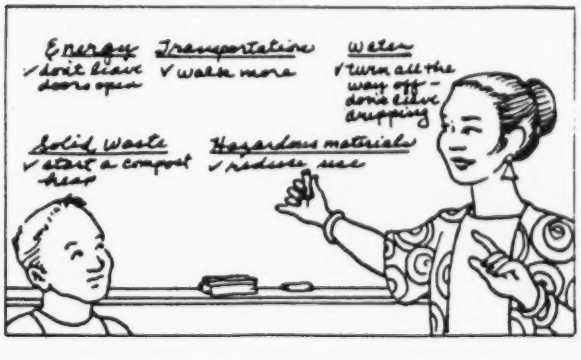
b. Calculate what the "classroom population" would be by the year 2029 if it were to grow by 1.8% per year (the annual rate of global population growth) Multiply or have the students multiply the number of students in the class by 1.018, 39 times (or years to arrive at the yearly population growth.

   For example: If you have 40 students in your class, you would multiply 40 x 1.018 = 40.72. This is the classroom population increase for 1991. For 1992 you would multiply 40.72 x 1.018=41.45, in 1993, 41.45 x 1.018 = 42.20, and so on.

c. Take the final number of students in the class in the year 2029 and multiply by the class averages calculated in step eight to give you the added impact of "classroom population growth."

d. Discuss how population growth can have an impact on the environment.

11. Write the following headings across the blackboard or on pieces of butcher paper: Energy, Transportation, Water, Solid Waste, Hazardous Materials. Brainstorm with the students about ways to practice the more efficient use of natural resources and to reduce our impact on the environment both at home and at school. List these ideas under the category headings. Consider all options for individuals, families, classes and schools, from turning off the water when brushing teeth to organizing a recycling club at the school.



12. Hand out the **Action Guide** and explain that it is a take home list of simple things that a family can do to help the environment.

EXTENSION ACTIVITIES:

1. Have students choose and implement one of the ideas they suggested in the brainstorm activity above.

2. Research and write a paper on an "environmental hero"—an individual that has taken action on behalf of the environment—ranging from figures such as **Rachel Carson**, author of *Silent Spring* to the **Mothers of East L.A.** who have successfully stopped the siting of toxic waste incinerators and freeways in their neighborhoods. Send a letter to the editor of the local paper about the "heros" researched.

3. Interview senior citizens to get a historical perspective about each issue area (water, recycling, toxics, transportaion, energy).

4. Research and compile data on the amount of natural resources used by individuals in the United States as compared to people in countries in Europe, Asia, Latin America, and Africa.

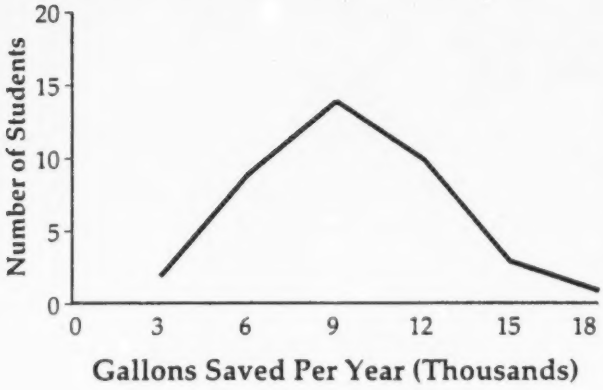
5. Study a local environmental issue. Create a solution that meets the needs of the interested parties and suggest it to the community at a town meeting, a local environmental or civic organization or place of worship.

6. Create a display that focuses on our use of natural resources. Combine various forms of art media, such as paint, clay, photographs, etc., and symbols of consumer goods such as light bulbs, batteries, and plastic six-pack rings. Such a display could be placed in a library, senior center, town hall or local YMCA.

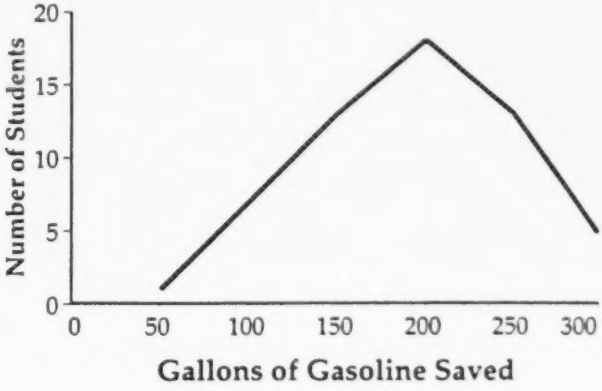
6. Refer to Earth Day 1990 "Schools' Ideas" sheet in this packet for more suggestions.

SAMPLE POLLING GRAPHS FOR CONCLUSION ACTIVITY

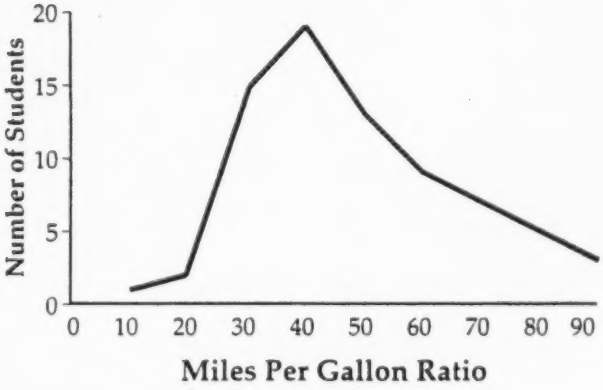
WATER CONSERVATION



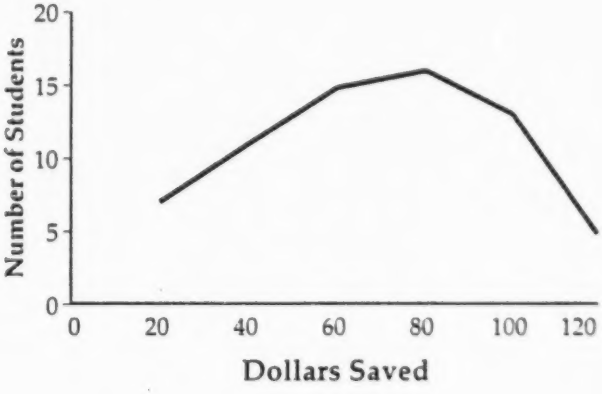
SOLID WASTE



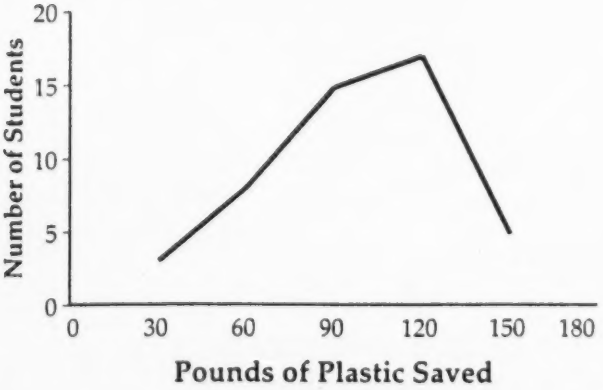
TRANSPORTATION



ENERGY



HAZARDOUS MATERIALS



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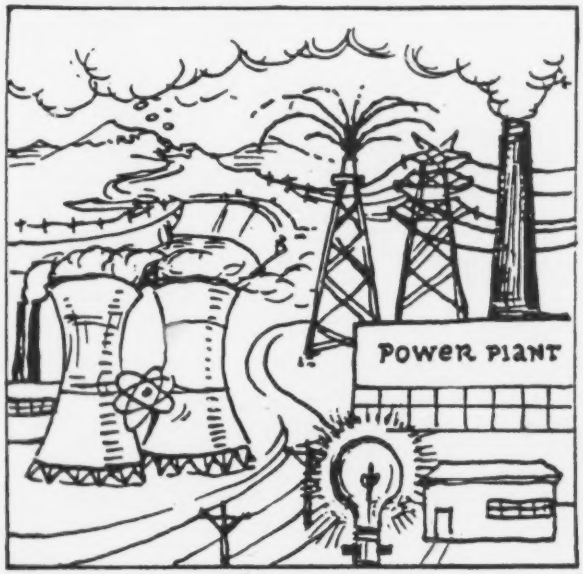
SURVEY—7-12

ENERGY:



DID YOU KNOW...?

Each person in the U.S. uses the average energy equivalent of 80 pounds of coal every day.

As much energy leaks through American windows every year as flows through the Alaskan pipeline.

EXERCISE:

Determine how much energy and money you could save if you replaced all of the light bulbs in your house with new, compact fluorescent bulbs, which give off as much light, last much longer, and use much less energy.

You may have to research the price per kilowatt hour in your town. Either look at your (parents) electric bill to find out the charge or call your local utility company. Ask for the average *cost of a kilowatt hour.*

Step 1—Count how many light bulbs you have in your house. Count lamps and overhead lights but exclude night lights and other fixtures which take smaller bulbs. _____

Note: *Compact fluorescent bulbs, on average, last nine to ten times as long as the ones you are currently using in your home. Additionally, over the lifetime of the bulb, it saves approximately $3.50 for every penny you pay for a kilowatt hour of electricity. For instance, if you pay 10c per kilowatt hour, you will save 10 X $3.50 = $35.00 with a flourescent bulb. Compact flourescent bulbs cost approximately $15 each, however, since they last so much longer, they, in fact, are cheaper and more efficient to purchase.*

Step 2—Take the number of bulbs and multiply by $3.50 and then, by the price (in cents) of a kilowatt hour. _____ This figure represents how much money you could save in energy costs if your bulbs were replaced with compact fluorescent bulbs.

TRANSPORTATION:

DID YOU KNOW...?

In one year, traffic congestion alone wasted about 3 billion gallons of gasoline—about 5% of the nations' annual gas consumption.

A car that only gets 18 miles per gallon—the current average for cars driving U.S. roads—will produce more than 57 tons of carbon dioxide (a gas linked to global warming) in its lifetime. A car that gets 26.5 miles per gallon (the

standard set for 1989 automobiles) will emit 20 tons less.

EXERCISE:

Calculate how efficiently your family uses energy for its daily transportation needs. For the purposes of this exercise, we will focus on the miles per gallon (mpg) figure.

Step 1—Identify how the various members of your family get to and from work and/or school. Who takes the bus? Subway? Does anyone carpool? Who travels by themselves in a car? You will interview each, or as many people as possible in your family to find out their PMPG (Personal Miles Per Gallon). PMPG is a way of seeing how efficiently we travel. People who get the most out of their fuel have high PMPG's. Those of us who are gas guzzlers have low PMPG's! To find out how your family rates, go on to Step 2.

Step 2 —To determine the PMPG for those members of your family who travel by car, find out how many miles per gallon (mpg's) each car in your family gets. If you don't know this information, ask a parent or guardian. (also, see Bonus Question, below) If the person(s) who drive travels alone, then their PMPG figure is the same as the figure for the car. However, if they carpool, then multiply the car's mpg figure by the number of passengers in the car. This figure represents the PMPG for each person in the car.

For example: if one of your parents drives to work with two other people in a car that gets 25 miles per gallon, then each person in the car is getting 75 miles per gallon. Each person has a PMPG of 75.

Step 3—Determine the PMPG figures for those members of your family who use mass transit. Buses, on average, get 4 miles per gallon. Subways get, on average, 1.5 mpg. Commuter trains get approximately 1.25 mpg (all figures calculated for gasoline). To calculate the PMPG for people who take mass transit, ask them how many people usually ride the bus or subway. If they are unavailable, simply estimate the number of people that ride the bus or subway with them. Multiply that figure by the mpg figure for the bus, train, or subway. The product, as in the carpool example, gives you the PMPG figure for these people. For example, if a bus gets 5 mpg and 40 people ride it to school in the morning, each person is getting 200 miles per gallon.

Family Member	Form of Transportation	Personal MPG
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

Step 4—Compare the PMPG ratings of your family members. Circle the ones with the highest and lowest PMPG ratings. The person with the highest rating uses energy most efficiently.

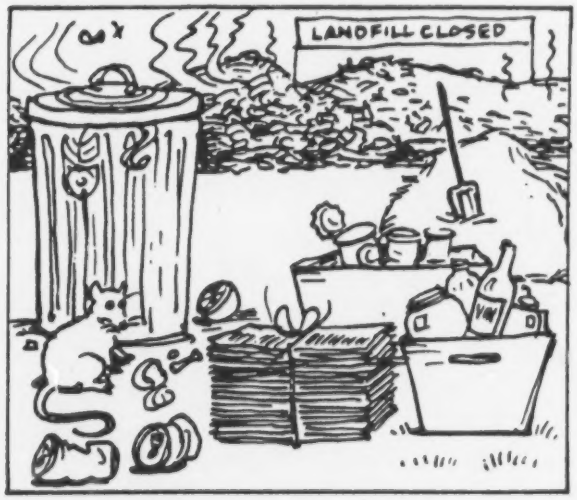
Note: If you or your parents bike or walk to work or school then you are PMPG superstars and off our scale!

BONUS EXERCISE:

You can find out the mpg rating of your families car by looking up the model and year in Consumer Reports journals. The mpg figure listed in these reports are not the most accurate because they represent the mpg's of *new* cars. If you want to figure out the *exact* mpg of the car(s) in your family, divide the miles the car(s) itself travels between fill-ups by the number of gallons of gas you put in at the second fill-up. Calculate the PMPG's of family members who drive after you have discovered this accurate figure.

14

SOLID WASTE/ RECYCLING:



DID YOU KNOW...?

Every year, we throw away 28 billion glass bottles and jars—enough to fill the twin towers of New York's World Trade Center every two weeks.

Recycling a ton of paper save 13 trees, prevents 3 cubic yards of waste paper (enough to fill a large pick-up truck) from going to the dump, and uses 64 % less energy than manufacturing paper from wood pulp.

EXERCISE:

Determine how much your family could save in the course of a year through recycling aluminum cans and glass bottles.

Step 1—Count up the number of bottles and cans your family uses each week. You may have to ask family members themselves how many cans they use or estimate to the best of your ability. Be sure to include cans used at home, work, and during school. _____

Note: *For every can you recycle, you are saving as much gasoline as would half-fill that same can. For every 25 aluminum cans you recycle, you are saving a gallon of gasoline.*

Step 2— Take the figure from Step 1 and divide it by 25. _____ This figure indicates how many gallons of gasoline your family could save during a week. How many gallons of gasoline could your family save in a year? _____

Step 3—Repeat Step 1 for glass bottles. How many bottles do you recycle or throw away during the course of the week?_____

Note: For every 100 bottles you recycle, you save a gallon of gasoline.

Step 4—Take the figure from Step 3 and compute how many gallons of gasoline your family could save in a week? _____

A year? _____

WATER USE

DID YOU KNOW...?

Over 70% of the planet's surface is covered by water, most of it salt-water oceans. Freshwater, upon which we depend for drinking and agriculture accounts for only 3% of all of the water on earth and 75% of that is frozen in the North and South Poles.

15

BEST COPY AVAILABLE

If every American household installed a low-flow shower head in its shower(s), they would reduce their water use and hot water heating costs by as much as 50% and as a nation we would save over 900 billion gallons of water every year.

EXERCISE:

Determining how much water your family could save if the shower head(s) in your household were replaced with low-flow shower heads.

Note: Low-flow shower heads, on average, use half as much water as the standard shower head. They do not reduce your comfort level, but still save water, energy, and money. Remember, water heaters are big users of energy. By using less hot water in your shower, you are reducing the amount of energy you are using.

Step 1—Time or estimate in minutes how much time each member of your family spends in the shower every day.

Family Member #1 (you) _____

Family Member #2 _____

Family Member #3 _____

Family Member #4 _____

Family Member #5 _____

(add more if there are more people in your family)

TOTAL TIME (in minutes) _____

Note: On average, a shower that has a low-flow shower head uses 3 gallons per minute—a regular shower head uses approximately twice as much or 6 gallons of water per minute.

Step 2—Multiply the total time your family spends in the shower by 6. _____
This is approximately how much water your family uses every day in the shower.

Step 3—Divide the number of gallons of water used (the answer in Step 2) in half and you will discover how much water your family could save every day by installing a low-flow shower head. _____

How much per week saved?_____

How much per year saved? _____

BONUS EXERCISE:

If you would like to find out the exact amount of water that comes through your family's shower head(s), conduct the following experiment and exercise.

Step 1—Gather the following materials: a stop-watch or a watch with a second hand and an empty 1/2 gallon milk container with the top cut off.

Step 2—Turn on the shower and mix hot and cold as you normally do. Wait until the second hand is exactly on the minute and put the milk carton under the shower head so it catches all the water. As soon as it fills, check the number of seconds it took and write that number down. _____

Step 3—Divide 30 (60 seconds to calculate for a whole gallon, 30 if you're using a half gallon) by the number of seconds it took you to fill your jug. This is the shower flow rate in gallons per minute.

_____

Step 4—Subtract 3 from the number of gallons per minute you got in Step 3—This is how much water a low flow shower head would save every minute.

_____

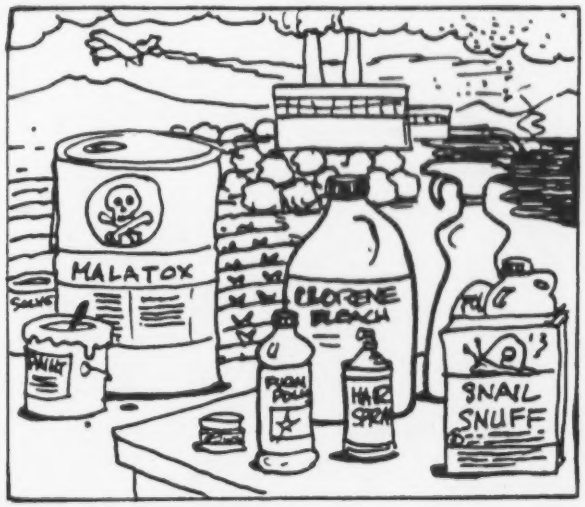
How much would it save every day given your families use of the shower? (use the total in Step 1 above)_____

How much every week in your house? _____

How much every year? _____

16

ENVIRONMENTALLY HAZARDOUS MATERIALS



DID YOU KNOW...?

In 1983, 266 million tons of hazardous waste were generated—more than a ton for every person in the United States.

In an EPA ranking of the 20 chemicals whose production generates the most total hazardous waste, five of the top six are chemicals commonly used by the plastics industry.

EXERCISE:

Determine how many pounds of plastic and cadmium (a toxic component of all batteries) your family throws away in the course of a year.

Step 1—List all of the different kinds of plastic containers and packaging your family brings home and throws away every week. (e.g.: plastic bags, plastic tubs, wrapping around food and non-food items, etc.)

Types of Plastic Packaging

_____

_____

_____

_____

_____

_____

_____

_____

_____

Step 2—Estimate how many plastic bags your family uses every week: _____

Step 3—Take figure from Step 2 and multiply it times 0.02, which is the average weight of a plastic bag from the grocery store. _____ This figure will represent how many pounds of plastic bags your family collects or throws away each week. How many pounds of plastic bags each year?

_____

Note: *Imagine how many pounds of plastic packaging your family must throw away each year.* ***In fact, on average, each of us discards close to 45 pounds of plastic packaging every year for a national total of over 5.5 million tons.***

Step 4—Estimate the number of batteries that your family utilizes to operate major appliances, tools and toys in your home for the period of a year. _____

Step 5—Take the figure from Step 3 and multiply it by 1.2 . _____ This figure represents how many pounds of the toxic metal cadmium you would keep out of the environment if you were to substitute rechargeable batteries for the standard kind. _____

ACTION GUIDE

Energy

Did you know...?

As much energy leaks through American windows every year as flows through the Alaskan pipeline.

If every household in the United States used compact fluorescent light bulbs for their lighting needs, we could save the energy equivalent to that generated by 22 large nuclear plants.

What You Can Do

- Check with your utility company to request a free energy audit.
- Insulate and weatherstrip your home.
- Wrap your hot water heater in an insulation blanket.
- Replace your incandescent light bulbs with compact fluorescent bulbs that screw into standard sockets. They burn ten times as long and use only one quarter of the energy.
- When purchasing appliances buy the products that use the least energy.

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April 22

Water

Did you know...?

Fresh water, upon which we depend for drinking and agriculture accounts for only 3% of the total amount of water on the planet. Three-fourths of this fresh water is frozen in the North and South Poles.

We could save over 250 million gallons of fresh water per day if every American home installed faucet aerators.

Transportation

Did you know...?

In one year, traffic congestion alone wasted about 3 billion gallons of gasoline—about 5% of the nation's annual gas consumption.

If every commuter car carried just one more passenger, we'd save 30-40 million gallons of gasoline and keep 12 million pounds of "greenhouse gases" out of the atmosphere every day.

What You Can Do

- Walk or ride your bike for short errands.
- Use public transportation or car pooling. Let someone else do the driving and take another car off the road.
- Choose an automobile that gets good gas mileage (at least 35 miles per gallon).
- Have your car smog checked and install pollution-control equipment if necessary.
- Keep your car tuned up and running well. A poorly tuned car wastes gas and creates added air pollution.

Solid Waste/ Recycling

Did you know...?

Americans, on average, generate three and a half pounds of garbage every day.

It takes more than 500,000 trees to produce the newspapers Americans read in one Sunday.

What You Can Do

- Separate your cans, bottles, plastic containers & bags, and newspapers and recycle them.
- Organize a recycling program at your school, office, apartment building, or place of worship.
- Use cloth napkins and towels instead of the paper variety; canvas grocery bags rather than the plastic and paper ones; permanent dishes and silverware instead of plastic, paper, and styrofoam replacements. Use cloth diapers instead of their plastic counterparts. Take your mug to school or work instead of buying a beverage in styrofoam.
- Encourage your school, office, or neighborhood group to use recycled paper for its stationary, photocopier, and printing needs.

What You Can Do

- Install a low-flow showerhead. They won't affect your comfort level in the shower and you'll save money, energy, and water.
- Put a bottle of water in your toilet tank to cut down on water use per flush.
- Check water-lines, pipes, faucets and toilets for water leaks.
- Take shorter showers; try not to leave the water running while brushing your teeth, washing vegetables and rinsing dishes.
- When washing your car, use a bucket of water or a hose with an automatic shut-off nozzle instead of letting the hose run.

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Toxics

Did you know...?

In 1983, 266 million tons of hazardous waste were generated–more than a ton for every person in the United States.

Americans throw away 25 billion styrofoam cups annually, enough to circle the Earth 436 times.

What You Can Do

- Check your supply of cleaning supplies to see which ones might contain toxic ingredients. Replace them with non-toxic alternatives such as baking soda, borax, natural soap, washing soda (sodium carbonate) and white vinegar.
- Think before you throw it away. Before disposing of a container, use up the entire product.
- Try to avoid unnecessary plastic products and containers.
- Do not drain automotive fluids into the sewer. Oil, antifreeze and batteries can be recycled at some gas stations and brake fluid and transmission fluid should be taken to a special hazardous waste disposal facility.
- If you are unable to completely use or recycle a hazardous product take it to a hazardous waste disposal facility.

F A C T S H E E T

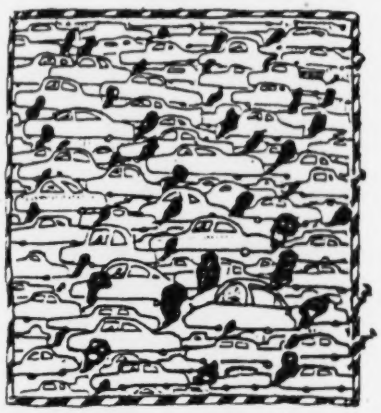
The Automobile

This fact sheet was prepared with the assistance of the Worldwatch Institute. Lester Brown, Project Director of the Worldwatch Institute, is a member of Earth Day 1990's Board of Directors.

How Do Cars Affect the Environment?

America's love affair with the automobile has a heavy impact on the environment. Burning gasoline emits pollutants into the air we breathe; chlorofluorocarbons (CFCs) from leaky car air conditioners deplete the ozone layer; oil and other automotive fluids contaminate water and soil; and large tracts of land are lost as they are covered with asphalt to make roads and parking lots. Despite the magnitude of these problems, more people are driving greater distances. The problem will only get worse unless changes are made in our transportation priorities. We desperately need better public transportation, improved carpooling programs, increased interest in biking and walking, and higher gas mileage standards for automobiles.

Automobiles use approximately half of all the oil consumed in the United States. To keep up with this demand, oil companies are drilling in sensitive natural areas, such as in offshore waters and in the pristine wilderness of



Alaska. With the Earth's known usable oil reserves expected to be depleted by the year 2040, oil is becoming harder to extract and the process is inflicting greater damage to the environment. As the U.S. supply dwindles (it is expected to run out by 2020), more oil will be imported from foreign sources across great expanses of water, leading to increased oil spills. The recent Exxon Valdez oil spill in Alaskan waters clearly illustrated the scale of the risks involved.

When oil is burned, large amounts of carbon dioxide, the major "greenhouse gas," are released into the air. Greenhouse gases trap heat from the sun in the Earth's lower atmosphere, causing temperatures to rise, a process known as global warming. Automobiles are responsible for about 20 percent of carbon dioxide emissions in the United States, with the average car releasing about five tons every year. Automobiles also emit about 40 percent of the nitrogen oxides that contribute to acid rain, as well as poisonous carbon monoxide and hydrocarbons that cause smog. 158 million Americans live in areas that violate the Clean Air Act standards.

Automobile air conditioners use CFCs (Freon) that, when discharged into the atmosphere, destroy the Earth's protective ozone layer that shields us from cancer-causing ultraviolet light. In 1985, a hole the size of the continental United States was discovered in the ozone layer over Antarctica. CFCs also are responsible for as much as 25 percent of the global warming trend. Although there are far fewer CFCs than carbon dioxide molecules in the atmosphere, each CFC molecule is up to 15,000 times more efficient at trapping heat. One charge of CFCs from an automobile air conditioner contributes as much to global warming as the carbon dioxide emitted from an average new car driven 20,000 miles.

More than 60,000 square miles of land have been paved in the lower 48 states to accommodate America's 135 million cars. This amounts to 2 percent of the total land surface — an area the size of Georgia. Close to half of the land area in most cities goes to providing roads,

"In an environmentally sustainable global economy most of us will probably be riding bicycles rather than driving cars."

-Lester Brown, Project Director, Worldwatch Institute

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highways and parking lots for automobiles, and two-thirds of Los Angeles is paved.

The Solution

Raising the fuel efficiency standard for automobiles will cut down on air pollution by requiring less gasoline to be burned per mile driven. There are already cars on the market that get 50 miles per gallon or more. Converting segments of our transportation system to cleaner burning fuels, such as compressed natural gas, methanol and ethanol, may also improve air quality. However, methanol is a questionable fuel because when it is derived from coal it releases twice as much carbon dioxide as oil. Furthermore, alternative fuels do not address the problem of traffic congestion and highway expansion. The true solution to our transportation problem lies with improvements in public transportation and carpooling programs, and increased interest in biking and walking.

According to the American Public Transit Association, commuting on mass transit in place of driving cuts hydrocarbon emissions that produce smog by 90 percent, carbon monoxide emissions by more than 75 percent, and nitrogen oxides emissions by up to 75 percent. Despite these impressive figures, only one penny of the nine cents per gallon federal gasoline tax is used to improve mass transit.

Railway Age magazine points out that a single highway lane can accommodate 2,250 people per hour in automobiles, 9,000 in buses, 15,000 on a light rail line and 34,000 people per hour on a heavy rail line. The newest French train is capable of traveling at a speed of more than 180 miles per hour while saving energy and providing a safe, comfortable ride.

What You Can Do

- Walk or bike for close errands.
- Arrange for a carpool with your coworkers.
- Use public transportation whenever possible.
- If it's reasonable, ask your employer to allow you to work at home one or two days a week.
- Encourage your employer to offer a financial incentive in place of a parking permit.
- Take a job close to your home or move closer to your place of work.
- Enjoy local recreational activities rather than traveling long distances for entertainment.
- Urge your local officials to improve and promote public transportation, carpooling programs and bicycle lanes.
- Write your elected officials and urge them to support legislation to raise the fuel efficiency standard for automobiles and to put funding towards public transportation rather than highway expansion.
- If you are buying an automobile, consider a model that:
  - Gets good gas mileage (at least 35 miles per gallon).
  - Doesn't have an air conditioner.
  - Has radial tires with a high tread rating for longer use.

- For proper driving and maintenance:
  - If your car has an air conditioner, make sure the CFCs are recycled anytime it is serviced and before the car is scrapped.
  - Have your car smog checked and install pollution-control equipment if necessary.
  - Keep your car tuned up and the tires properly inflated.
  - Call ahead before shopping and consolidate errands.
  - Avoid quick acceleration and deceleration and keep your speed under 60.
  - Avoid "drive-through" lines where your car engine must idle for long periods.
  - Recycle used motor oil, transmission fluid, brake fluid and antifreeze.
  - Turn in your old battery when you buy a new one.

For More Information

- **Worldwatch Institute**
  1776 Massachusetts Ave., NW
  Washington, DC 20036
  (202) 452-1999
- American Public Transit Association
  1201 New York Ave., NW, Suite 400
  Washington, DC 20005
  (202) 898-4000
- Environmental Action
  1525 New Hampshire Ave., NW
  Washington, DC 20036
  (202) 745-4870
- National Association of Railroad Passengers
  236 Massachusetts Ave., NE
  Suite 603
  Washington, DC 20002
  (202) 546-1550
- Sierra Club
  730 Polk St.
  San Francisco, CA 94109
  (415) 776-2211

FACT SHEET

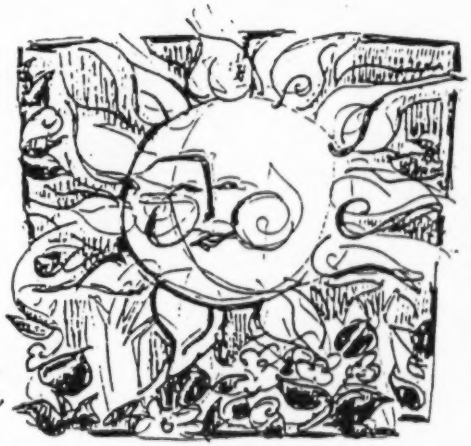
Energy & Environment

This fact sheet was prepared with the assistance of California Energy Company. Charles T. Condy, Chairman and Chief Executive Officer of California Energy Company, is a member of Earth Day 1990's Environmental Advisory Council.

Energy Production

It is often difficult to grasp the importance of energy in our lives. On any given day, we may drive to work, turn on a heater, store food in a refrigerator, take a warm shower, watch TV, turn on lights and cook dinner. All of these actions use energy. Americans use more energy per person than any other people on Earth, yet we also have a deep appreciation of nature. Unfortunately, our energy practices often harm the environment. Acid rain, global warming, oil spills and nuclear waste are all directly related to the way each one of us uses energy.

When fossil fuels (oil, coal and gas) are burned to power vehicles and machines or to produce electricity, they release "greenhouse" gases (most notably carbon dioxide) and pollutants that cause acid rain and smog. Greenhouse gases are changing the Earth's climate, a process that scientists believe will lead to increased droughts and flooding, a rise in sea levels and mass extinctions of plants and animals. Acid rain, also caused by fossil fuel use, is destroying rivers, lakes and forests.



Nuclear energy produces between 15 and 20 percent of our electricity. But in the process of producing energy, nuclear power creates plutonium and other radioactive wastes that remain dangerous for tens-of-thousands of years.

Energy Efficiency

By using energy more efficiently we can reduce the negative impacts of energy production without sacrificing our standard of living. For example, there are now compact fluorescent light bulbs that screw into standard sockets and are easy on the eyes, but they use only a quarter as much energy as conventional incandescent bulbs. They cost more initially, but last about ten times as long, and save up to $40 apiece in energy costs over their lifetimes. For every incandescent bulb that is replaced with a compact fluorescent bulb, about half a ton of carbon dioxide is kept out of the atmosphere.

Other measures, such as insulating homes and buildings and insisting on higher gas mileage from our vehicles, have the potential to reduce our energy use significantly. In response to the oil shortage of 1973, the U.S. took measures to greatly improve its energy efficiency, and as a result was able to cut its oil use by 13 million barrels per day. Between 1973 and 1986 our economy grew 35 percent while energy use remained at the same level. Despite past improvements, the U.S. still uses twice as much energy as Japan per unit of economic output. If the U.S. reached Japanese levels of efficiency, we would save $220 billion annually.

Renewable Energy

Renewable energy resources, most notably solar, geothermal and wind, are abundant and cause little harm to the environment. Using renewable energy can be as simple as designing a building to face south to take advantage of heat from the sun.

Solar energy can be used for heating or to convert sunlight directly into electricity — a technology called photovoltaics. Photovoltaics are now com-

"In order to halt the greenhouse effect and clean up the smog-filled air that rests above our cities, we must begin to use our energy more efficiently and move quickly towards a more diversified energy mix, taking maximum advantage of clean, renewable resources such as geothermal, solar and wind. The solutions are in hand. What is needed is education and action."

-Charles T. Condy, Chairman and CEO, California Energy Company

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monly used to produce electricity in remote areas that lack power lines and for powering space satellites. Another form of solar energy, called solar thermal, produces heat and electricity by concentrating sunlight on a receiver containing fluid. The heated fluid runs through pipes that are submerged in water, creating steam to power an electric turbine. Improvements in solar technology over the past 15 years have greatly reduced its cost, and solar may soon be competitive with conventional energy sources, especially if environmental costs are included.

Geothermal energy uses natural steam from the Earth to produce electricity. According to the Department of Energy, there could be more domestic energy potential in geothermal resources than in either oil or gas. Over 250 geothermal plants are in operation worldwide with a total and planned capacity of 13,000 megawatts. Natural steam resources provide California with almost seven percent of its electricity needs. Calfornia Energy Company's Coso Geothermal Project currently produces 240 megawatts – enough electricity to meet the needs of 240,000 Southern California households.

In California, where most of the country's wind turbines are located, wind power generates nearly 2 billion kilowatt hours of electricity per year — enough to meet the needs of a city the size of San Francisco. Every year, wind energy in California keeps 11 million pounds of air pollutants and 1.8 billion pounds of greenhouse gases from passing into the atmosphere.

Renewable energy and energy efficiency are the only solutions to pollution caused by energy production. As energy consumers, each one of us can contribute to a healthier planet by using energy more wisely.

What You Can Do

Transportation
- Use public transportation, carpool, bike or walk.
- Purchase a car with high gas mileage (at least 35 MPG).
- Keep your car tuned up.
- Cut down on unnecessary driving by living close to your place of work, calling ahead before shopping, and consolidating errands.
- Avoid "drive-through" lines where your car engine must idle.

Heating and Cooling
- Ask if your local utility company offers home energy audits.
- Have your furnace tuned-up and adjusted for maximum efficiency.
- Insulate and weatherstrip your home.
- Install a "time-of-day" thermostat to avoid unnecessary operation.
- Install double-paned windows or storm windows.
- Close doors to rooms seldom used and turn off the heat or air conditioning in these areas.

Water Heater
- Insulate your water heater and storage tank, including piping.
- Set your water heater no higher than 120 degrees F.
- Minimize hot water use (for example, use water-efficient showerheads).
- Install a solar heating system.

Appliances
- Turn off appliances not in use.
- Replace incandescent lights with screw-in compact fluorescent bulbs.
- When purchasing an appliance, compare energy-use information and shop for efficiency.
- Use your dishwasher and washing machine only with full loads.
- Wash clothes in cold water.
- Dry clothes in the sun.

For More Information

- **California Energy Company**
  601 California St., Suite 900
  San Francisco, CA 94108
  (415) 391-7700
- Alliance to Save Energy
  1725 K Street, NW #914
  Washington, DC 20006
  (202) 857-0666
- American Council for an Energy Efficient Economy
  1001 Connecticut Ave., NW #535
  Washington, DC 20036
  (202) 429-8873
- Conservation & Renewable Energy Inquiry & Referal Service
  P.O. Box 8900
  Silver Spring, MD 20907
  1-800-523-2929
- Geothermal Education Office
  664 Hilary Drive
  Tiburon, CA 94920
  1-800-866-4436
- National Appropriate Technology Assistance Service
  P.O. Box 2525
  Butte, MT 59702-2525
  1-800-428-2525
- Renew America
  1400 16th St., NW, Suite 710
  Washington, DC 20036
  (202) 232-2252
- Rocky Mountain Institute
  1739 Snowmass Creek Rd.
  Snowmass, CO 81654
  (303) 927-3128
- Solar Energy Research Institute
  1617 Cole Blvd.
  Golden, CO 80401
  (303) 231-7303

FACT SHEET

Global Warming

This fact sheet was prepared with the assistance of the World Resources Institute. Gus Speth, WRI's President, is a member of Earth Day 1990's Board of Directors.

What Is Global Warming?

Over the past century, the human species has turned the Earth into one huge unplanned experiment. By releasing unprecedented amounts of greenhouse gases (carbon dioxide, methane, chlorofluorocarbons, nitrous oxide and gases that create tropospheric ozone) into the atmosphere, we have in effect, turned up the global thermostat. Greenhouse gases act in a fashion similar to the windshield of a car parked in the sun, allowing light-energy to pass through, but then trapping the re-emitted heat. The greenhouse effect occurs naturally and without it the Earth would be ice-covered and uninhabitable. However, over the past century, human practices have led to an increased buildup of greenhouse gases.

Scientists already have detected a 1 degree F temperature rise, which may be due to the greenhouse effect. They predict a further increase of between 4 and 9 degrees F by the middle of the next century if greenhouse gas emissions grow at expected rates. The 6 warmest years of the century have been in the 1980s, with 1987 and 1988 being the hottest on record. As world population and fossil fuel use grow, greater quantities of greenhouse gases will be released into the atmosphere. Although the U.S. has only 5 percent of the world's population, we are responsible for 25 percent of the carbon dioxide that is released from burning fossil fuels.

Carbon dioxide (which accounts for approximately half of the global warming trend), nitrous oxide and tropospheric ozone are by-products of burning fossil fuels (coal, oil and gas) and wood. It is important to note that burning natural gas releases 70 percent as much carbon dioxide per unit of energy as oil, and half that of coal. Forests and oceans are natural sinks for carbon dioxide, but are unable to absorb the quantities currently being emitted. Deforestation releases large quantities of carbon dioxide as well as methane, carbon monoxide, ozone and nitrous oxide. Methane, which accounts for 18 percent of the greenhouse effects, also is produced by swamps, cattle, rice paddies, landfills, termites, swamps and fossil fuels. Chlorofluorocarbons (CFCs), used in refrigerators and air conditioners, as foam blowers, as circuit board cleaners and as aerosol propellants, account for 17 percent of the greenhouse effect.

Scientists predict that as global temperatures rise, life on Earth will face a series of potentially disastrous threats. Precipitation will decline in some areas, leading to crop failure and expanding deserts. Elsewhere, rainfall will increase, causing flooding and erosion. Changes in habitat could lead to mass extinctions of plants and animals that are unable to migrate to more compatible climates. And sea levels will rise, flooding coastal areas and causing salt water intrusion into coastal aquifers.

"Global warming is one of the gravest threats facing our planet. The buildup of carbon dioxide and other heat-trapping gases in the atmosphere threatens far-reaching climatic change. Although there is increasing awareness that our environmental problems are very serious, only modest efforts have been launched to deal with them. Earth Day 1990 offers an opportunity for unprecedented individual action as well as national and international efforts on a scale equal to today's challenges."

-Gus Speth, President, World Resources Institute

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